

higher in the late afternoon. On Aug. 22, 1911, Aug. 12, 1912, and Aug. 16, 1914, two sorties occurred on the same day. This has also been occasionally observed by Forel in the field. On Aug. 9, 1914, there were three sorties, but the time of their occurrence was not recorded.

NEW LIMNOPHILINE CRANE-FLIES FROM THE UNITED STATES AND CANADA (TIPULIDÆ, DIPTERA).

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The tribe Limnophilini of the subfamily Limnobiinæ, in the Nearctic fauna, includes a considerable number of species placed in a relatively small number of genera. During the past few years a number of interesting forms have accumulated in the collection of the author and these are described herewith; I am greatly indebted to Mr. C. W. Johnson, Mr. Frederick Knab and Mr. W. L. McAtee for the loan of this and other material sent me for study.

Limnophila marchandi, new species.

Allied to *L. alleni*; color of the thorax gray; ground color of the wings hyaline; basal abdominal tergites gray with prominent setigerous punctures.

Female.—Length, 30 mm.; wing, 20 mm.; Middle leg, femora, 10 mm.; tibiæ, 8.7 mm.; tarsi, 8.6 mm.

Rostrum short, dark brown, palpi dark brown. Antennæ with the two basal segments dark brown, the flagellum light brown; first scapal segment elongated; segments of the flagellum short, gradually narrowed to the seventh segment of the organ beyond which the segments are very slender and attenuated. Head dark brown, the margin of the vertex adjoining the inner margin of the eye, paler, more yellowish; head narrowed behind.

Pronotum light brownish gray, clearer gray on the sides, with a delicate impressed median line; scutum with numerous long hairs whose bases are surrounded by brown spots. Mesonotal præscutum clear light gray with three dark brown stripes; the middle stripe is broad, the median area is paler brown and narrowly bisected by a very delicate dark brown median line which runs the length of the sclerite; the middle stripe does not attain the transverse suture; lateral stripes short, crossing the transverse suture onto the scutum; the pale area between the lateral and middle stripes is lined with a paler shade of brown; sides of the sclerite bearing abundant long pale

hairs many of which are encircled by a dark brown spot producing a dotted appearance which is especially noticeable before the pseudosutural foveæ; scutum clear, light gray with five brown lines, the outermost pair very broad, dark brown, continuations of the lateral præscutal vittæ; inside these stripes a pair of narrow lighter brown stripes; a delicate median brown vitta continued backward from the middle præscutal stripe; scutellum gray with numerous long pale hairs which are surrounded by indistinct brown spots; postnotum gray, the sides dark brown. Pleura clear light gray, indistinctly and delicately lined and dotted with pale brown. Halteres short, pale, the knob brownish just before the apex. Legs with the coxæ gray; trochanters dull yellow; femora dull yellow, their apices dark brownish black; tibiæ dull yellow, the apices narrowly black; tarsal segments one and two brown, narrowly tipped with black; remainder of the tarsi black; legs hairy. Wings hyaline or nearly so, the costal cell dark brown; a yellowish spot before the arculus and before the radial cross-vein; brown markings as follows: a large blotch beyond the arculus; at the origin of R_s ; at the end of the sector continuing down to the cell 1st M_2 ; apex of the wings in cells 2d R_1 and R_2 ; grayish brown seams on the crossveins and deflections of veins; a grayish brown cloud in cell Cu continuing down into the tip of cell 1st A ; pale gray clouds in the middles of the other cells of the wings. Venation as in plate 1, fig. 2; Sc_1 ending just beyond the base of cell R_2 ; crossvein r not far from the tip of R_1 ; R_{2+3} shorter than the deflection of R_{4+5} ; cell 1st M_2 hexagonal; M_{1+2} beyond m about equal to the basal deflection of Cu_1 ; basal deflection of Cu_1 only a little longer than the prominent downward deflection of M_3 .

Abdominal tergites with the first segment dark brown; remaining tergites light gray with a salmon caste; a broad dorso-median dark brown line; lateral margins indistinctly pale; a narrow sublateral brown line; the entire surface is densely spotted with prominent brown setigerous punctures; sternites pale grayish brown with an indistinct narrow dark brown median line and impressed lines on each segment forming an irregular quadrate figure; the surface with abundant brown setigerous punctures; caudal margins of the sclerites silvery.

Habitat.—Eastern United States.

Holotype, ♀, Framington, Connecticut; June 7, 1914; Dr. R. W. Marchand.

The type is in the collection of the Boston Society of Natural History.

This interesting crane-fly is closely allied to *L. alleni* Johnson, (see plate VIII, fig. 1) from which it may be separated by the appended key. It is curious that there should be two such striking Limnophilas found in the eastern states and overlooked by collectors until within the last few years. This fly was handed to me for description by Mr. Johnson, to whom I am indebted for many other kindnesses and at his suggestion I dedicate the species to the collector,

Dr. R. W. Marchand. The tent-trap observations made at Ithaca, N. Y., in 1915 by Miss Ruby B. Hughes indicate that the larvæ of *Limnophila alleni* live in wet organic mud.

1. Larger (wing, ♀, 21.5 mm.); thoracic dorsum reddish brown with three velvety brown stripes, the middle one narrowly split by a line of the ground-color; wings yellowish and brown; basal abdominal tergites yellow without prominent setigerous punctures.....*L. alleni* Johnson.
 Smaller (wing, ♀, 20 mm.); thoracic dorsum gray with three, narrow velvety-brown stripes, the middle one split by a broad pale line; ground-color of the wings hyaline; basal abdominal tergites gray with prominent setigerous punctures*L. marchandi*, n. sp.

Limnophila mundoides new species.

Black, the thoracic dorsum shiny; wings hyaline or nearly so; femora yellow, the anterior pair with the apical half black; hypopygium of the male enlarged, complex in structure.

Male.—Length, 5.6 mm.; wing, 6.2 mm.

Rostrum black, very short, palpi brownish black. Antennæ black, short, the first segment elongated, the flagellar segments elongate-oval. Head black.

Thorax shiny black. Halteres white. Legs slender, the coxæ dull yellow, the base of the fore coxa suffused with black on the outer face; trochanters dull yellow; femora not conspicuously hairy, fore femora with the basal half yellow, the apical half dark brown; middle femora with the basal two thirds yellow, the apical third dark brown; hind femora yellow, the tip narrowly browned; tibiæ brown; tarsi dark brownish black. Wings hyaline or nearly so, the stigma indistinct, the veins dark brown. Venation as in plate 1, fig. 3: *Sc* short, ending just before the tip of the sector; *Sc*₂ close to the tip of *Sc*₁; *Rs* long; *R*₂₊₃ very short, subequal to the basal deflection of *R*₄₊₅; *M*₁₊₂ beyond *m* about equal to cell *M*₁; basal deflection of *Cu*₁ almost underneath the middle of cell 1st *M*₂.

Abdomen black, the sternites somewhat paler. Male genitalia remarkably developed for this genus of flies, this condition approached by no Nearctic species hitherto described but suggesting in some respects the condition obtaining in *Phyllolabis* O. S. and *Oromyia* Alex. The ninth tergite arched, convex, produced caudally into a prominent median lobe which is slightly enlarged apically and truncated to slightly concave across the tip; sides of the tergite with numerous very long, prominent hairs; the ninth sternite is not distinct from the tergite, produced caudad on the mid-line beneath into a prominent bifid lobe which bears an abundance of very short pubescence and a few long hairs; ninth pleurite complete; pleural appendages two, a caudally lying, very slender, slightly curved chitinized lobe that is directed caudad, the tip inward; the anterior lobe is densely hairy on the outer face, the apex chitinized. Just dorsad of the bifid sternal appendage, on either side, arises a prominent flattened lobe with exceedingly abundant long black hair and numerous punctulations; the ventral apical angle of this lobe is pale and produced into a short hook directed inward.

Habitat.—Eastern United States.

Holotype, ♂, Plummers Island, Maryland; June 3, 1914; R. C. Shannon.

Paratype, ♂, Beltsville, Maryland; June 9, 1915; W. L. McAtee.

The type is in the collection of the United States National Museum.

This interesting fly differs from *L. munda* Osten Sacken (see plate VIII, fig. 4), which it superficially resembles, in the hyaline wings, the legs are not conspicuously hairy, the increased amount of black on the fore and middle femora and the prominent genitalia of the male.

***Limnophila terebrans* new species.**

Black, the thorax with a slight gray bloom; wings slightly suffused with brown: R_{2+3} very short, less than the deflection of R_{4+5} .

Male.—Length about 7.5 mm.; wing, 7.7 mm.

Female.—Length, 8 mm.; wing, 8.1 mm.

Rostrum very short, dark brown, the palpi similar in color, very short. Antennae rather short, the first segment elongated, dark brown, remaining segments of the organ submoniliform, the apical segments of the flagellum not conspicuously elongated, flagellum light brown, the segments with a dense pale pubescence. Head broad, the vertex broad and bearing a very low, obtuse tubercle. Head dark gray.

Thorax black with a yellowish gray bloom over the entire surface, the usual mesonotal interspaces with prominent long yellow hairs; postnotum more reddish. Halteres short, stout, dull yellow. Legs with the coxæ dark brown; trochanters brownish yellow; legs of the male longer and more slender than those of the female which are club-shaped and more conspicuously hairy; femora yellow tipped with dark brown, the fore femora with the apical half brown, the hind pair with only the apex darkened; tibiae brown; tarsi dark brown. Wings with a slight brownish tinge, the stigma dark brown, cross veins and deflections of veins seamed with brown. Venation as in plate 1, fig. 5: R_s elongate, slightly arcuated at the origin; R_{2+3} short, a little less than the deflection of R_{4+5} ; petiole of cell M_1 longer than this cell. The right wing of the allotype is abnormal, the cell R_2 nearly sessile; cell 1st M_2 very small to obliterated, the petiole of cell M_1 much longer than this cell.

Abdomen dark brown; valves of the ovipositor very long and slender, the tergal valves slightly upturned at the apex.

Habitat.—Eastern United States.

Holotype, ♂, Cabin John, Maryland; May 5, 1899.

Allotype, ♀, topotypic, in coitu with the type.

The types are in the collection of the United States National Museum.

The related species of this group may be separated by the key that is appended to the following species.

Limnophila barberi new species.

Black, the interspaces of the mesonotal præscutum with a gray bloom; fore femora brown except at the extreme base.

Male.—Length, 6.4 mm.; wing, 8.3 mm.

Female.—Length, 7.6 mm.; wing, 8.1 mm.

Rostrum very short as in this group of the genus, dark brownish black, the palpi dark brown. Antennæ short, dark brown, the apex of the first segment a little brighter. Head dark brown with a sparse grayish bloom.

Mesonotal præscutum black with a sparse gray bloom, the usual thoracic stripes devoid of bloom, very shiny and very broad; scutum similar, the median area broadly gray pruinose; scutellum and postnotum dull brown. Pleura dark brown with a light gray bloom, the dorsopleural membranes indistinctly dull yellow. Halteres pale, the knob very little darker. Legs with the coxæ dull yellow, a little brownish on the basal half of the outer face; legs slender, the femora yellow with the apices brown, on the fore legs including all except the extreme base of the segment, on the hind legs including a little more than the apical half; tibiæ and tarsi dark brown. Wings sub-hyaline, crossveins and deflections of veins narrowly seamed with brown, the costal cell light brown, the stigma indistinct, the veins dark brown. Venation (see plate 1, fig. 6), as in the *munda* group, the radial sector elongated, almost straight, R_{2+3} about equal to the deflection of R_{4+5} ; basal deflection of Cu_1 just before the middle of cell 1st M_2 .

Abdominal tergites dark brownish black, the sternites more reddish; male hypopygium more reddish; the valves of the ovipositor of the female chestnut.

Habitat.—Western United States.

Holotype, ♂, Eureka, California; May 24, 1903; H. S. Barber.

Allotype, ♀, topotypic, in coitu with the type.

The types are in the collection of the United States National Museum.

The species is dedicated to the collector, Mr. H. S. Barber, of Washington.

The species that are allied to, or resemble, *Limnophila munda* O. S. may be separated by the following key:

1. Mesonotal præscutum entirely shiny black2
- Mesonotal præscutum with a gray bloom, at least on the sides of the sclerite3

2. At least the basal half of all the femora yellow; legs stout, hairy; wings tinged with brown (fig. 4) *munda* O. S.
Fore femora with the extreme base only, yellow; legs slender, not conspicuously hairy; wings almost hyaline (fig. 3) *mundoides* n. sp.
3. Entire mesonotal præscutum with a gray bloom; fore femora with only the apices brown; venation in fig. 5 *terebrans* n. sp.
Interspaces of the mesonotal præscutum with a gray bloom; fore femora brown except at the extreme base; venation as in fig. 6 ... *barberi* n. sp.

***Limnophila terræ-novæ* new species.**

Belongs to the *adusta* group; head gray; thorax dark brown; wings infuscated with brown at the tip.

Female.—Length, 9.5–11.3 mm.; wing, 9.2–11.4 mm.

Rostrum and palpi dark brown. Antennæ with the first segment elongated, dark brown with a sparse grayish bloom; segments two to six yellowish brown; the terminal segments brown. Head gray.

Mesonotal præscutum dark brown, shiny, covered with a sparse yellowish brown bloom which becomes almost lacking on the median area; scutum, scutellum and postnotum similar to the præscutum. Pleura brown, sparsely grayish yellow pollinose, the dorso-pleural membranes yellow. Halteres yellow with the knob brown; legs with the coxæ and trochanters shiny yellow; femora brown, slightly brightened basally; tibiæ and tarsi brownish yellow, the latter more brownish apically. Wings with a pale brown tinge, the costal cell brown, yellowish at the base of the wings; stigma elongated, dark brown; apex of the wings infuscated; brown seams along the cord, crossveins and deflections of veins; *Cu* and *Rs* narrowly seamed with brown. Venation (see plate VIII, fig. 7) as in the *adusta* group.

Abdomen dark brown, the ovipositor reddish.

Habitat.—Newfoundland.

Holotype, ♀, Sandy Lake, Newfoundland; July 28, 1906; Owen Bryant.

Paratypes, 2 ♀'s, topotypic, July 25–28, 1906.

The type is in the collection of Mr. Charles W. Johnson; paratypes in the collection of the author.

This fly comes closest to *L. similis* Alex. (Eastern U. S.), *L. fulvocostalis* Coq. (Bering Is.), and *L. insularis* Johnson (Bermuda); *L. similis* has the legs with the brown apices to the segments narrow, the costal cell yellow, etc.; *L. fulvocostalis* resembles *similis*, with the costal cell yellowish brown, the wing-apex not infuscated; *L. insularis* has the wings unmarked, the legs yellowish with the tarsi browned toward the tips.

***Limnophila oslari* new species.**

Belongs to the *lenta* group; body-coloration gray; wings whitish with a distinct oval brown stigma.

Male.—Length, 6.2–6.8 mm.; wing 6.8–7.6 mm.

Rostrum and palpi dark brownish black, grayish pruinose. Antennæ moderately elongated, dark brownish black, the segments gray pruinose; segments of the flagellum oval. Head clear light gray, with numerous setigerous punctures on the sides.

Thorax and pleura clear light gray without stripes. Halteres light yellow. Legs with the coxæ and trochanters reddish yellow; femora dark brownish black, the base more yellowish; tibiæ and tarsi dark brownish black. Wings whitish subhyaline, the stigma oval, dark brown; veins dark brown. Venation as in plate 1, figs. 8, 9: the venation somewhat variable as in the related eastern species, *L. lenta* O. S.; *Sc* ending just before the tip of the sector; *Rs* shorter than or equal to R_{2+3} , usually strongly arcuated to angulated at the origin; crossvein *r* on R_{2+3} , at the fork or on R_2 ; crossvein *r-m* arcuated; basal deflection of Cu_1 at the fork of *M* to one third the length of cell 1st M_2 .

Abdominal tergites dark gray, the hypopygium reddish yellow.

Habitat.—Colorado, New Mexico.

Holotype, ♂, Platte Canon, Colorado; July 30, 1914; E. J. Oslar.

Paratype, ♂, Colorado (ex collection C. V. Riley).

Paratype, ♂, White Mts., New Mexico, South Fork of Eagle Creek, alt. 8000 feet, August 18; C. H. T. Townsend.

This species differs from the related Eastern species, *L. lenta* O. S. in its gray coloration, that of *lenta* being yellow or yellowish.

***Limnophila osborni* Alexander.**

1914 *Limnophila osborni* Alexander; Proc. Acad. Nat. Sci. Philad., 1914, p. 596, pl. 25, fig. 6.

This interesting late summer crane-fly seems to be northern in its distribution. A male and a female from Price Co., Wisconsin, August 29, 1897, as part of the W. M. Wheeler collection, is in the American Museum of Natural History. The female sex has never been characterized and the specimen is made the allotype:

Sex ♀, similar to the male but larger; the abdominal tergites brown, indistinctly trivittate with darker; ovipositor with the tergal valves upcurved, elongated, slender, subacute, the sternal valves split into hair points at the tips. Length, 9.2 mm.; wing, 9 mm.

The allotype is in the collection of the American Museum of Natural History.

***Trichocera (Diazosma) subsinuata* new species.**

Differs from the described species of the genus in the subsinuata course of the second anal vein; wing-veins long-hairy.

Male.—Length, 7.3 mm.; wing, 9.2–10 mm.

Female.—Length, 8–9 mm.; wing, 9–11.4 mm.

